



## **COFFEE BREAK: Environmental Flows and their Binational Implications**

**August 17, 2022**

### **Brief Summary**

#### **SPEAKERS**

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**Moderators:** Rosario Sanchez, Senior Research Scientist, TWRI; Samuel Sandoval Solis, Professor, UC Davis.

The Forum convened to consider the role of environmental flows in binational waters. Topics for discussion included the concept of environmental flows, the challenges involved to secure environmental flows in binational waters, the implications considering the current drought conditions, and strategies to achieve such flows.

#### **Explain the concept of environmental flows and how it relates to the transboundary ecosystem, governance structures and water agreements such as compacts and treaties.**

Considering the overall social landscape, water system governance is mainly focused on managing water for agriculture which goes with water rights issue and consumptive use for productive purposes requiring diversion from river flows. The system is not built for environmental flows. If agriculture is at the center of water use, it makes sense to consider the diversity of farming systems on a spectrum of how this has developed.

At one end of the spectrum are the indigenous and small-scale farmers of the colonial period that are highly adapted to the natural hydrographic flow; the natural timing, pulses and flows of the river system. Gravity in the flood plain is the main source of water movement in this era.

At the other end of the spectrum are farming systems that have arisen in the 19<sup>th</sup> and 20<sup>th</sup> centuries that now invest in water storage and distribution mechanisms. This can bring

thousands of acres of land under agriculture that do not even have to be near a river, true in both countries.

If environmental flows become competitive with agricultural systems, it is important to understand what is at stake for all parties and consider how points along the spectrum are aligned or not with natural flows.

Increasing urban population in these areas also puts pressure on water resources. We are seeing people in the US wanting to acquire water rights in one place and move them to another place. Identity, too, factors in here where the river and its ecosystem are a source of identity for those who live along it pursuing their traditional occupations.

Environmental flows are river flows dedicated toward achieving some ecological or natural resource benefit. In systems like the Rio Grande which have been perturbed for more than a century and are governed by international treaties, there is no going back to pre-disturbance conditions. This forces us to define our goals, a daunting task for humans to say what an environmental flow might be.

This requires us to be geographically specific about where we are talking. In the El Paso/Juarez valley the ecosystem is essentially destroyed. In the Big Bend downstream from Ojinaga the river is a continuation of the Rio Conchos basin. In 2011, goals were written for the Big Bend region for ecosystem environmental flows. These flows need to address more than just the quantification of minimum base flows. For example, are we only focusing on native species or on boating or floods or what? The river system as a whole is now in disequilibrium.

“Environmental Flows” may not be the best term to use because it has stigmas around it. Many people see themselves as separate from the environment and may not understand why it is important to them. If we substituted the term, “Functional Flows,” it might be more productive as people would understand the importance of a functioning river system. Functional flows would mean that, under international treaties, water is flowing in a way that supports the overall functioning of the river system, allowing the river to do its job. For example, evacuating sediment to the Gulf, minimizing the negative impact of floods, keeping the water clean, providing habitat for native plants and wildlife, and supporting riparian communities and agriculture.

Water is not just a commodity that we extract from a river for our use. The river will die if we continue to manage it in this way and this will also kill the communities along the river. We need to stop fighting over water and make sure that the people, wildlife, and plants along the

river can persist into the future, not easy in the context of climate change and drought. The river must be more than just a conveyance channel for occasional deliveries of water.

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Many of us relate to the river as part of our identity. The people who are indigenous to the region can be an example of how to live in right relationship to the river. The indigenous worldview of the river knows that we depend on her and have a duty to live in a reciprocal relationship with her and take care of her so she can take care of us. Water managers and all of us would do well to consider this way of thinking.

The first user of water is the environment. From a functional perspective how can we take this water to the main users? We cannot continue as we are doing. There is more water on paper, i.e., concessioned, than there is real water, and this makes it difficult to request water for the environment.

There is competition between the human right to water and the environment but in Mexico the agricultural sector is dominant. The law says that the first user is the 1944 Treaty. Politics is the issue even when people agree that the environment is important, but it is usually the last to “speak.” A modification was made in the fourth article of the (Mexican) constitution where the human right to water and sanitation and the human right to the environment are established.

It is basically to have environmental flows, the ecosystemic shipments in the Rio Grande basin where we have different types of users, but we must also remember the first user is the Treaty. The job of determining environmental flows is done in the Council of Cuenca where the first user is considered and everyone agrees that environmental flows are necessary, but these are considered in relation to the other users of the river, and it was for the agricultural sector that the dams and river control system were developed.

### **What are the challenges to implement environmental flows?**

The whole system of treaties and compacts are very entrenched and slow to change. Ground and surface water have been managed separately, too, and only recently have been considered together. Not all farmers can pump groundwater. The concept of environmental flows is a big challenge apart from river flows alone. What does it mean to have a healthy ecosystem? Who decides? For whom? Who benefits? What values are used to decide?

The connections between a healthy river system and restored environmental flows have not been sufficiently defined for those who live in the system. For a scientist it might be a “given,” but that is not the case for everyone else. For example, people talk about water rights that are tied to a use-it-or-lose-it mindset that is a driver in many people’s behavior. Farming is not a portable desk job; it is tied to the land.

On the political side of this issue there must be very clear objectives for environmental flows. These objectives are likely to be different along different reaches of the river. The Rio Grande/Rio Bravo is a disequilibrium channel that is continually changing and losing channel capacity as sediment overwhelms the system, making it difficult to quantify. A typical environmental flow analysis is based on the flow needed to inundate a flood plain. Every ten to twenty years the entire system is inundated by a hurricane too. Though damaging to the human system of the river these are hugely beneficial ecologically, resetting the environmental flows.

For the Big Bend reach, everything is linked to the reservoir release on the Rio Conchos and based on the Treaty that is very complicated. Unfortunately, most identification of flows are paper exercises not backed up by science and, if it is to deal with real world policy makers and people of the river making sacrifices, the scientific community needs to be aware of this and know how much water is needed in order to speak to the effects.

The 2014 pulse release from Morelos Dam demonstrated that it is better for environmental flow to route the water through the irrigation system of canals to individual plots rather than to run it down the river. This is the real world now. To implement environmental flows on the Rio Grande/Rio Bravo there needs to be one singular event like the Morelos Dam experiment in which the environmental and science communities come together and watch what actually happens.

This would show what good it did, can it be better, and can it be analyzed and reported to the IBWC and other parties? As it is now, there is not a single scientific experiment on which to base real world policies for this reach; it's all just a paper exercise.

There is a "Tragedy of the Commons" effect happening here in that people do not understand how environmental flows can benefit them. We need to get the message across that people are not separate from the ecosystems in which they live and participate, that they are supported by them and have a role to play in their proper functioning. We have not been doing a very good job of fulfilling our stewardship and all the water in the basins is over-allocated. For that matter we don't even know if it is possible to create a mini version of the river through managed flows and create a functional lift. In other words, can we mimic the shape of a natural hydrograph and expect the river to function better than "she" does? At this point, functional flow recommendations are just hypotheses that need to be tested. Much of what has been learned on the Colorado Delta is applicable to the Rio Grande.

The main challenge for Mexico is the Treaty. We are dealing with a basin attached to a treaty.

Try telling the users that the water belongs to a treaty and not to them! All the water is already concessioned; there is no water from which can be derived an environmental construction. It is not feasible is this scheme to designate flows for environmental use. Ecological studies have

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also been carried out, but the issue does not go beyond knowing what amount of flow is required for life, because it is a study that has been going on for a long time. How can we go from paper to the application of policies?

We are not only talking about a single user, and it is a very big challenge for environmental use in Mexico because, in the national water law, environmental use is in the sixth place of priority. Environmental flow is the last consideration. In Mexico a lot of political will is required for users to understand that the environment is not really the one who is going to take away the water, but rather the one who is going to ensure that the ecosystem continues to provide the ecosystem services and, in the end all the users are going to benefit from that.

**What are the implications to implement environmental flows considering the current drought conditions, climate change, treaty agreements, etc.?**

Are we dreaming? Is this possible? There is no water so how do we talk about giving it to environmental flows for the functionality of the river system?

One way might be to look at examples of where people are finding ways to implement some level of environmental flows, e.g., the Rio Bosque Park, that keeps water in the stream. These efforts are typically small scale and very place-specific and could include renting/leasing water rights on a temporary basis to see what works. Also, the creation of entities tasked with looking after environmental flows. Let's experiment.

Studies done out of the University of Arizona in the 1990s showed that increased flows brought riparian vegetation back to life. This was published "hard" natural ecological science. Similar science is needed to quantify flows to say what we need. The 2001 report by the Sonoran Institute was a manifesto for bringing the delta back to life and the identification of the amount of flow that was needed. Subsequent high-level negotiations between the respective federal and state governments were conducted to get agreement. It is incumbent upon researchers to be networked in at these high levels or risk nothing happening.

Then it took an earthquake in Mexicali to destroy the system which led to the storage of Mexican water in Lake Mead and ultimately Minute 319, that provided water for the 2014 environmental pulse flow experiment for the Colorado River Delta. But levels of the federal government and farmers intervened to say, "We're not doing that." The amount of water was decided at those levels and not at the science level.

Implementation is even harder because there is zero water in Elephant Butte; it all must come from the Rio Conchos. The argument for environmental flows has to be made at the level of the decision makers, e.g., a coffee table book that gets to every one of them in Mexico City and

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Washington, DC and that lays out the case and identifies the water. Build a massive public relations campaign for this.

This will be harder in the current severe drought. The river is going dry along the border and cannot provide the ecosystem functions we depend on. How much water is lost when a Treaty delivery is made on a dry riverbed? Could the Colorado River pulse flow experiment happen on the Rio Grande? The current IBWC commissioners are interested in this idea as they work on a new Treaty Minute for the Rio Grande. There is political will to consider this now in the IBWC.

In the Council of Cuenca the problem is this situation has become politicized and, when the political factor comes into a question of water, at the end of the day it becomes a very difficult situation to manage technically. Where the environmental groups are represented, it has been shown that it can be done even when there is no water for environmental use through the concession. It is possible to manage the flows of account from the Upper Basin to the mouth of the Rio Bravo in the Gulf of Mexico.

While the ecological reality is that the water belongs to Nature, the political reality is that it belongs to the nation. But in the political discourse it becomes evident that the water belongs to a few. Then the situation breaks down and agreements cannot be reached. If we cannot agree among us, the authorities (CONAGUA) will do it for us.

### **What are the strategies to implement environmental flows?**

Thinking about the political interests involved leads to pessimism. Capital resources play a large part in this. On the other hand, who are the people pushing the boundaries to put pressure on the system from above? Having the right data from experience helps keep the pressure on. Not just flow data but data from the communities affected to adapt to a new water regime that includes environmental flows, because not everyone is treated equally under the current water regime.

There are two reasons for optimism. First, the Colorado River is fully allocated yet there is a discussion about environmental flows focused on how some small amount of water can be reserved for environmental purpose in the delta. It is a hopeful sign that the issue has moved that far in the current circumstances. This won't involve the river at all but will involve routing water through irrigation canals.

Secondly, the resources of the Rio Grande/Rio Bravo are far more exciting. Start someplace wonderful, like the Big Bend. Forget about the El Paso/Juarez valley and think in terms of the lower canyons and the flows needed to make that place great. There needs to be a national campaign to put this issue on the agenda of every person who cares about restoring rivers. It

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requires coffee table books and a lead organization to do it, and the recognition that it is an immense challenge due to the politics of water use in the Rio Conchos.

The lower canyons are “outrageously wonderful” and worth protecting. The current commissioners on the IBWC are interested in discussion on this topic and nature-based solutions. The low-hanging fruit would be actions that support functional flows, specifically the formation of an adaptive management work group that could bring additional scientific knowledge and expertise about how the river functions and how treaty deliveries could be managed for multiple objectives. These could include sediment management, water quality, flood mitigation, improved habitat, the support of river-dependent economies and lifestyles, and recreational opportunities. These are all things that the river should do.

The first step is improved communication, e.g., alerting scientists when treaty deliveries are made so they can measure and monitor the impact of different flow regimes on the river to understand what a functional flow would look like. Secondly, how can those of us who see the river holistically and recognize how she functions to support human life and the life of all our relations get this message across to a broader public and all the sectors concerned about water in the river?

The Salazar Center at Colorado State University is taking a big interest in the Rio Grande basin hosting webinars and an upcoming conference. Perhaps they can help us with some of these communication needs?

We need to have a broader vision than just focusing on the flows and, especially, consider population growth. How can we adapt our way of life given the drought conditions? Projections have been carried out for water that is not there now. If the use of water in agriculture is more efficient, the savings can be used for the environment.

In Tamaulipas, resizing the irrigation districts creates volumes of water that were recovered but the legal mechanisms were not attuned to retain that amount of water and how it was going to be assigned to other users. The concept was fine, but it was not well executed.

We need to add groundwater to the equation, too. It impacts the environmental flows consider both surface and groundwater.

The paradigm must change. We're never going to have enough water, anyway, so let's make the best use of the shortages. All of us have a role here.